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ABSTRACT

This discussion of how technology can and should be incorporated into the design of instructional systems for the use of disabled learners emphasizes the importance of the instructional designer being aware of the characteristics of the target population, including the psychomotor, cognitive, and affective factors involved. A "user-oriented instructional design process" model first proposed by Burkman is presented together with suggested adaptations specific to design for the disabled learner. It is argued that, in general, instructional tools for the disabled must: (1) be adaptable and accessible to a range of student users; (2) facilitate and enable cognitive, affective, and psychomotor growth on the part of students; (3) be affordable in terms of financial and logistical costs; and (4) be flexible enough to allow for continual refinement when subjected to formative and summative evaluations. It is concluded that the training and skills of the instructional designer provide a compatible match to those of the special education and therapeutic communities, and that these three groups together can provide a new level of cooperation in developing acceptable technological answers for use by the disabled learner. (8 references) (EW)

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Title:

SYMPOSIUM: Technological Equity: Issues in Ethics & Theory

Paper #1 The Ethics of Technological Intervention with Disabled Learners

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The Ethics of Technological Intervention with Disabled Learners

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The advent of what has come to be known as "new technologies" has served to open up new avenues for communication, mobility and physical interaction by disabled individuals. As these avenues have become increasingly defined and made available, the level of personal independence of the disabled user has evidenced a commensurate increase. But technological advances do not occur in a vacuum, they occur within a particular milieu and time. Such movements tend to take place in societies that have both wealth and a social concience; places where technological impetus can be directed toward more "humanistic" goals. But no society can insure that progress will occur, or even that such "progress" is in the appropriate direction! The disparity in societal goals, limited willingness to engage energy and resources, and the general public's lack of knowledge about disabled persons' needs cause progress in designing and developing technological answers for the disabled to be sporadic and lacking overall direction.

A groundswell of activity in special education and rehabilitation engineering has developed a wide variety of assistive devices and computer software designed to meet the needs of an even wider assemblage of handicapped users. In the midst of the burgeoning research and development activities comes an opportunity to re-examine the ethical implications of interventions using such devices in the delivery of instruction. It is important that ethical issues be included in the continuing dialog between the instructional design community and those involved with the education of disabled learners. There are several perspectives concerning the appropriate strategies required in order to design and develop quality instruction for disabled learners. Some viewpoints are associated with the perspective of the needs of the "dominant" culture in relation to a special interest subgroup; and others from the perspective of a disabled individual with abilities that can be enhanced by computer- or video-based instruction. Regardless of the perspective taken, each one imposes requirements and limitations on the design, development and implementation of assistive devices and software for the disabled.

The purpose of this paper is to discuss a few of the more pressing ethical issues associated with technological interventions and disabled learners. The issues raised are speculative in nature and are meant to encourage further questioning rather than to pose solutions to immediate or potential problems. Many of the issues are the result of questions raised in

the design of research being conducted at the Ohio State University. This research is investigating the use of robotic manipulators on the cognitive and affective skills and abilities of severely orthopedically handicapped children. Our efforts to analyze some of the cognitive and affective demands associated with technological interventions has led to a sobering realization of the extreme limitations imposed on researchers by unreliable and expensive assistive devices, problems with accessing these devices, and difficulties in training teachers, therapists and students to use the devices. The discussion that follows looks at a few key issues involving the role of the instructional designer in the process, presents a proposed model for designing technological interventions for the disabled, and some final comments.

Is Technology a One-Way Street?

There are some basic conflicts between the goals and needs of any society and those of its minority, or special needs, groups. One conflict involving the disabled and the larger population of non-handicapped individuals arises from the fact that most technological devices are designed and built with the physically-able person in mind. This bias permeates all aspects of the design process, evidencing itself in restricted access from the exterior of the device, and limitations within the device that make it difficult for it to be adapted for disabled users. Vanderheiden (1983) makes a reasoned plea for technological "curb cuts" similiar to those in our streets that have gradually been employed to allow greater access by wheelchair users. He advocates: 1) the initial consideration of potential disabled users in the design phase of equipment development, and 2) the incorporation of adaptive design features at the "circuit-board" level of production. This would allow for both immediate access to available peripherals and for future peripheral attachments, board expansions or display adaptations necessary for a variety of disabled users. Shworles (1983), a quadriplegic rehabilitation consultant, cautions us that, "The vast numbers of people with disabilities, the extreme variability from one disability condition to the another, and the complexity and fast-changing nature of the computer industry, when viewed all together, reminds us that the national challenge making computers accessible is only beginning to be done and could fall far short of being a job well done." (p. 325).

Realizing Hopes and Dashing Dreams.

The presence and use of computers, video, and even robots with disabled learners has evidenced modest, but generally positive, results in use with a variety of handicapping conditions, ranging from the mildly handicapped (Hasselbring, 1987), to the severely orthopedically handicapped (Leifer, 1983; Howell, Damarin, & Post, 1987). However, these initial successes belie the difficult and costly developmental effort that

went into each hardware or software innovation. They also do not encompass the even larger number of studies showing no significant effects, studies which were never reported, or pilot programs; all of whose findings are valuable for the field but are never disseminated on a national basis.

Another serious limitation of computers and other technologies involves the length of time it will take for some innovations to reach the marketplace and the even longer time for many of the devices to become affordable. These cautions should also be addressed in discussions of potential benefits accruing to the devices in order to add perspective to the real costs of developing and adapting devices for use with the disabled.

The Instructional Designer and the Disabled User

There is a surprising congruence between the conceptual foundations that underlie Instructional Systems Design Theory (Gagne, 1985) and accepted philosophy and practices in special education. Such critical features of the instructional design process as the identification of needs, the specification of individual goals and objectives, and the formative and summative evaluation of progress are also critical features of special education practices.

However, a similarity in processes does not guarantee a mutuality of perspectives concerning the importance of the individual in the learning process. In fact, it is all too easy to minimize or even forget the user in the design process once the needs assessment has been completed. Too often, the results of the assessments become isolated pieces of data in the design process that eventually have little to do with the reality of the changing person.

Maintaining an awareness of both the cognitive and affective dimensions of behavior is considered to be crucial to the development of all instructional products, and has been found to be important in the development of effective computerized instructional software (Damarin, 1987). However, even the most optimal design will always be a reflection of certain assumptions about the nature of learning, the role of the learner and teacher, and the integration of materials via the technological delivery systems. These assumptions almost always take the form of generalizations when they are operationalized into an educational product that is meant to be used by more than one individual. Thus, the more information the designer has about the characteristics of the target population(s), including psychomotor, cognitive and affective information, the more appropriate the technolgoical intervention will be for use by a variety of disabled learners.

Designing with the Disabled in Mind

Burkman (1987) has recently proposed a "user-oriented instructional design" process that attempts to incorporate the opinions, perceptions, and acceptance of the users of the instructional materials. This model, if applied with a few modifications, might reasonably meet the needs of the disabled learner. The model is presented below and includes proposed additions specific to the disabled learner. Burkman views the Potential Adopter of the planned product as "the instructors who would use the product"; the modified procedure appearing here presents the Potential Adopter as a disabled user of the planned product/technology.

Step 1: Identify the Potential Adopter (PA). Who would be affected by the planned product if it was to be adopted? What is the range of disabled individuals who can potentially use the product?

Step 2: Measure Relevant Potential Adopter Perceptions. Includes: 1) how PA's perceive that the instruction should be done, 2) the attributes of instructional products that they perceive to be important, 3) the specific aspects of physical control and communicative abilities of the learner brings to the task?

Step 3: Design and Develop a User-Friendly Product. This includes the use of the instructional design procedures developed by Gagne (1985) with two modifications:

1. The designer attempts to incorporate as many of the attributes that are valued by the PA and tries to make the presence of the attributes as apparent as possible.

2. Evaluative criteria are expanded to include the degree to which the PA: 1) perceives the product favorably, and 2) tends to adopt it and implement it effectively.

Step 4: Inform the Potential Developer. Once the product has been developed, inform any potential developers about the product, stressing its user-valued attributes.

Step 5: Provide Post-adoption Support. Once adoption has occurred, the teacher or instructor must be given the tools needed to implement the product.

Instructional tools developed through processes similiar to Burkman's must also evidence certain characteristics in order to be useful to a broad range of disabled persons. In general, they should be: 1) ***adaptable and accessible*** to a range of student users, 2) ***facilitate and enable*** cognitive, affective and psychomotor growth on the part of the students, 3) ***affordable,*** in terms of financial and logistical costs (includes training and maintenance considerations), 4) ***flexible*** enough to

allow for continual refinement when subjected to formative and summative evaluations.

Summary

The points expressed in this article illustrate the dichotomous reality of contemporary United States society which promises equal access but tenders only grudging acceptance of its disabled members. It is clear that disabled individuals and their non-disabled proponents must work hard to maintain progress that has been won in the past and move forward as their energy and resources allow. Forward to a future that is bright only if the design, development, and utilization of enabling technologies are seen as "tools for independence and expression". To be used by the disabled person and not for them.

The Instructional Designer's role is one which commonly reflects the values and mores of the larger culture and yet must also transcend the limitations that come with designing for the majority. This requires first of all, a sensitivity to the needs, attitudes and desires of the disabled among us. Secondly, a willingness to adapt and change procedures or materials to accomodate the needs of the disabled user. Finally, it demands that the designer maintain a constant awareness of the disabled users among the potential base of users of their products.

In summary, while the process of education continues to evolve with the use of new technological systems, the basic need for individual acceptance and respect of the disabled learner should remain within the focus of the instructional designer. The process of bringing about the changes necessary for greater independence to the disabled is not soley within the purview of the instructional design community, but their ability to contribute is evident. Their training and skills provide a compatible match to those of the special education and therapeutic communities and together can provide a new level of cooperation in developing acceptable technological answers for use by the disabled learner.

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